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are employed which are alkaline in nature and have the objection of staining the background.—ERNEST F. ARTSCHWAGER.

Size variation in secondary xylem.—BAILEY and TUPPER[8] have applied the comparative method in thoroughgoing fashion to an attack on the problem of cell size. Confining themselves to a study of the length of the tracheary elements in the secondary xylem of trees and shrubs among vascular cryptogams, gymnosperms, and angiosperms, they present data derived from thousands of measurements on some 440 species belonging to 124 families. The most conspicuous fact brought out by this reconnaissance survey is that the length of these elements is roughly correlated with phylogenetic position, being greatest in vascular cryptogams, somewhat less in gymnosperms, and least in angiosperms. This progressive reduction in the length of the wood cells has been associated with the reduction in amount of the primary xylem in the passage from lower to higher forms, but is probably due in greatest measure to the evolution and differentiation of vessels. These elements have become progressively shorter and broader, thus losing their resemblance to the primitive tracheid; and the fibers and tracheids associated with them have also grown shorter, although naturally to a less extent. Notable exceptions to the general rule are the vessel-less Magnoliaceae and Trochodendraceae, represented by *Drimys* and *Trochodendron*, which possess tracheary elements far longer than other angiosperms, and thus resemble the gymnosperms. Evidence from this source obviously supports the view that these genera are primitive rather than reduced types.

The authors have also made a preliminary study of the relations between the length of the tracheary elements and the age of the plant, its growth habit, and the environment under which it lives. So far as the cells studied are concerned, there is no definite correlation between body size and cell size. The tracheary elements may increase in length for a few years as the plant grows larger, but they soon reach a constant size. Dwarfed and depauperate plants tend to have somewhat smaller elements than normal individuals.

The authors point to the need of more intensive investigations in this hitherto almost unexplored field; and in particular call for a careful study of the activities of the cambium and the factors which direct these activities. Indeed the growing point of plants, once so enthusiastically studied as the key to histology and then for so long neglected, bids fair to be once more a center of interest as one of the keys to a knowledge of morphogenesis.—E. W. SINNOTT.

Sap concentration in epiphytes.—Continuing the studies already noted[9] upon the concentration of tissue fluids, HARRIS[10] has found in several species of

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[8] BAILEY, I. W., and TUPPER, W. W., Size variation in tracheary cells. I. A comparison between the secondary xylems of vascular cryptogams, gymnosperms, and angiosperms. Proc. Amer. Acad. 54:149–204. *figs. 6.* 1918.

[9] BOT. GAZ. 65:285–286. 1918.

[10] HARRIS, J. ARTHUR, On the osmotic concentration of the tissue fluids of desert Loranthaceae. Mem. Torr. Bot. Club 17:307–315. 1918.

Phoradendron growing in the Arizona deserts upon various hosts, such as species of *Acacia*, *Quercus*, *Fraxinus*, and *Populus*, that the osmotic concentration of the tissue fluids of the parasite is generally greater than that of the host. The concentration of the fluids of such parasites in this semidesert region is also greater than and usually about twice as great as that of similar plants found in the mountain rain-forests of Jamaica. These results quite agree with our expectations, but in a further paper the same investigator[11] clearly demonstrates the errors that would be involved in generalizing broadly on insufficient data.

The later investigations have to do with the tissue fluids of epiphytic Bromeliaceae, Orchidaceae, Piperaceae, and Gesneraceae, and these are shown to possess a decidedly lower concentration than those from terrestrial vegetation. In the mountain rain-forests of Jamaica the epiphytes show 37–60 per cent of the concentration commonly found in herbaceous terrestrial vegetation and 28–45 per cent of the concentration characteristic of ligneous soil plants. The epiphytes of the Jamaican rain-forests show lower concentrations than related plants of the same habit growing in the subtropical forests of Florida. The exactness of the data and quantitative character of the comparisons make these investigations important, and lead us to look forward for the further results promised in the study of parasitism by quantitative methods.—GEO. D. FULLER.

Bennettitales.—Two cones of the Bennettitales from the British Cretaceous, one of them a new species, have just been described by STOPES.[12] The first and most important is the one upon which she has founded the new species *B. albianus*, the specific name referring to the strata in which the specimen was found. Only a small piece of a single cone was found, but it was very well preserved. After a study of the topography, the entire fragment was cut, yielding 2 longitudinal and 5 transverse sections, the latter passing through the seeds and the former through their stalks. The most striking feature of the cone is its large size, not less than 70 mm. in diameter and probably more. The seeds are innumerable, as many as 600 showing in a single transverse section of the fragment. The seeds are 5–6 mm. long and 1.2 mm. in diameter, thus contrasting with the more or less ovoid seeds already described. The interseminal scales are fused around the apex of the seed. The embryo has 2 cotyledons and a rather massive hypocotyl and radicle.

The other specimen, *B. maximus*, was described from superficial characters by CARRUTHERS in 1870. The present study shows that the vascular axis is very small for such a large plant and the cones are bisporangiate, the first petrified bisporangiate cones which have been found in England. The cones

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[11] HARRIS J. ARTHUR, On the osmotic concentration of the tissue fluids of phanerogamic epiphytes. Amer. Jour. Bot. **5**:490–506. 1918.

[12] STOPES, MARIE C., New Bennettitean cones from the British Cretaceous. Phil. Trans. Roy. Soc. London **208**:389–440. *pls. 19–24.* 1918.